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ENCE 6097

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STRUCTURAL DYNAMICS

ENCE 6097

- INTRODUCTION
 - The Origins of Vibration Theory
 - Problems of Structural Dynamics
 - Fundamental Objective of Structural Dynamic Analysis
 - Types of Prescribed Loadings
 - Essential Characteristics of a Dynamics Problem
 - Methods of Discretization
 - Discrete Elements of Vibrating Systems
 - Newton's Second Law of Dynamics
 - D'Alembert Principle
- SINGLE DEGREE OF FREEDOM SYSTEM (SDOF)
 - Undamped Free Vibration
 - Homework 1
 - Damped Free Vibration
 - Viscous Damping
 - Homework 2
 - Coulomb (Frictional) Damping
 - Undamped Forced Vibration
 - Periodic Force
 - Support Motions
 - Damped Forced Vibration
 - Periodic Force
 - Transmissibility
 - Support Motion
 - Vibration Isolation
 - Homework 3
- EXAM 1
- GENERAL PERIODIC EXCITATIONS / STEADY STATE RESPONSE
- VIBRATION UNDER GENERAL FORCING CONDITIONS
 - Response Under a General Periodic Force
 - Response Under a Periodic Force of Irregular Form
 - Response Under Nonperiodic Force
 - Convolution Integral
- RESPONSE SPECTRUM
 - For Base Excitation
- RESPONSE TO IRREGULAR FORCING CONDITIONS USING NUMERICAL METHODS

- Numerical Integration Methods
 - Finite Difference Method
 - Central Difference Method For Single Degree of Freedom Systems
 - Wilson Method
 - Newmark Method
- TWO DEGREE of FREEDOM SYSTEMS
 - Undamped Free Vibration
 - Equations of Motion For Forced Vibration
 - Forced Vibration Analysis
 - Homework 4
- MULTIDEGREE OF FREEDOM SYSTEMS (MDOF)
 - Influence Coefficients
 - Flexibility Coefficients
 - Stiffness Coefficients
 - Matrix Formulation of Equations of Motion
 - Equilibrium Equations
 - Compatibility Equations
 - Damping Coefficients
 - Natural Frequencies and Mode Shapes
- EXAM 2
 - Modal Matrix
 - Orthogonality Properties of the Normal Modes
 - Generalized Mass and Stiffness Matrices
 - Modal Analysis - Principal Coordinates
 - Uncoupled Equations for Undamped Free Vibration
 - Uncoupled Equations for Damped Free Vibration
 - Rayleigh' Proportional Damping
 - Eigenvalue Solution Methods
 - Jacobi's Method
 - Equations of Motion - Forced Vibration
 - Force Excitation
 - Support Excitation
 - Modal Analysis (Modal Superposition Method)
 - Uncoupled Equations - Force Excitation
 - Uncoupled Equations - Support Excitation
- FINAL EXAM